TECHNICAL UNIVERSITY OF KOŠICE
Faculty of Mechanical Engineering

HORIZON-CL5-2023-D3-02-07: Development of next generation advanced biofuel technologies

Ideas for the project:
Development of next generation technologies for the production of novel advanced liquid and gaseous biofuels from biogenic residues and wastes including CO2 and organic part of wastewater or micro-algae (including cyanobacteria), through chemical, electrochemical, biochemical, biological and thermochemical pathways, or a combination of them. Focus should be on the high conversion efficiency and the low to near-zero carbon emissions from the overall production. Overall, proposals are expected to improve competitiveness and minimize GHG emissions through synergies with renewable hydrogen and other renewable energy technologies for processing energy. The new technologies should also address specifically uses in fuel cells for all transport modes for electricity generation from biofuels used as renewable energy carriers with high conversion efficiency and low pollution. The sustainability and GHG emissions should be assessed by an LCA and ways along the value chain to reduce them to and below net zero should be developed.
Our ideas for the project:
Newly developed next generation fuels need to be tested. One of the suitable methods of testing is the verification of the suitability of next generation fuels in operating conditions. Our effort is to support project solutions using our testing technologies, our experience, our methodology.
Previous solutions: The reduction of GHC emissions is supported by an appropriate way of burning the fuel. Our research deals with the development of the combustion space, combustion conditions, combustion process, so that an ideal combustion process is achieved, and therefore the production of a minimal amount of GHC emissions.

Experience and infrastructure offered:

- Motorcycle Chassis Dynamometer Model 250i: This dyno allows to perform several types of tests, including basic horse power/torque tests, real-time diagnostics and tuning, EFI calibration, and more.
- PEMS Portable Exhaust Gas Analyzer: The system allows to accurately measure the THC, NO/NO2, CO/CO2 and O2 concentrations in gasoline and diesel exhaust gas while on the move.
- Environmental Noise Meter for Vehicle

Projects solved, related to the issue:

The Slovak Research and Development Agency:

- Research and development of combustion technology based on controlled homogenous charge compression ignition in order to reduce nitrogen oxide emissions of motor vehicles. (2017-2020)
- Research and development of the advanced combustion technology in order to reduce the emission footprint of the motorcars. (2020-2024)

Partners in previous research projects:
Yamaha Motor company, University of A Coruña Spain, Silesian University of Technology, Poland, Brno University of Technology, Czech Technical University in Prague, Technical University of Liberec.

Contacts to industrial partners:

Yamaha Slovakia, VW Slovakia, Rošero -P, Continental, Yamaha, KEREX, s.r.o., Oerlikon, Matador, Tatravagonka Poprad, Embraco Slovakia s.r.o., U.S. Steel Košice, s.r.o., SEZ Krompachy a.s.,

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